CAMP RIPLEY

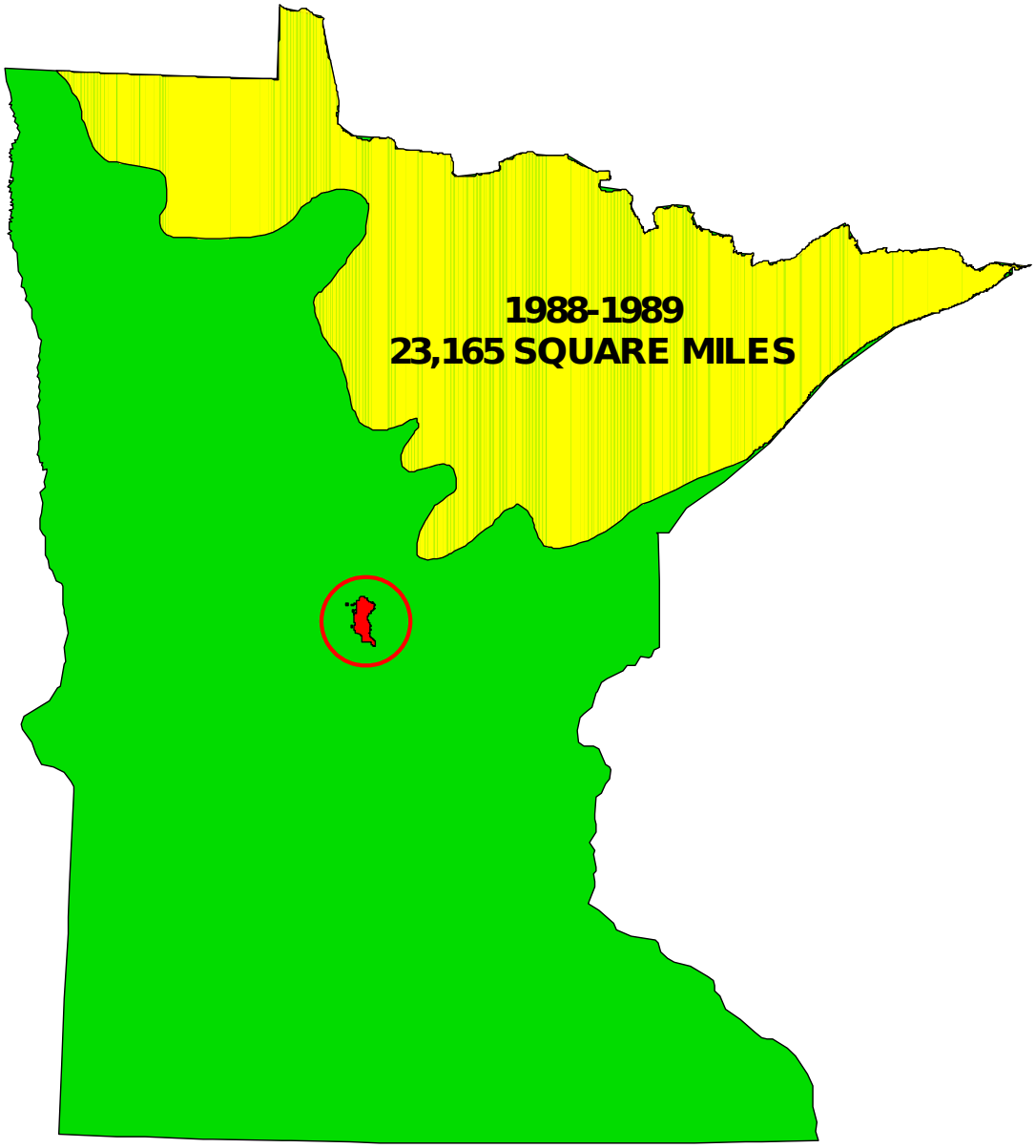
Wolves At Camp Ripley

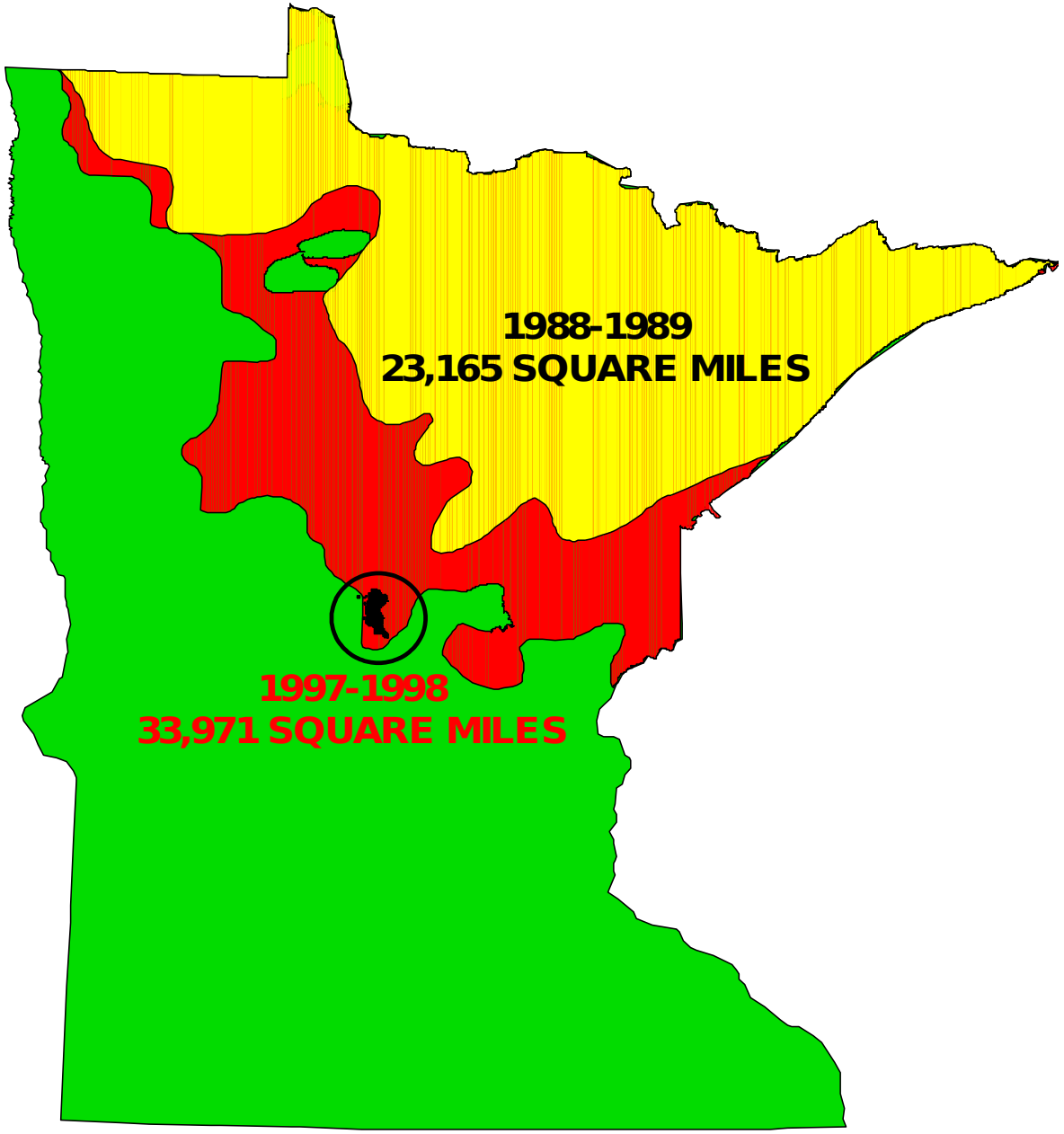
Can Military Training and Wolves Co-exist?

Complying With the Federal Endangered Species Act of 1973

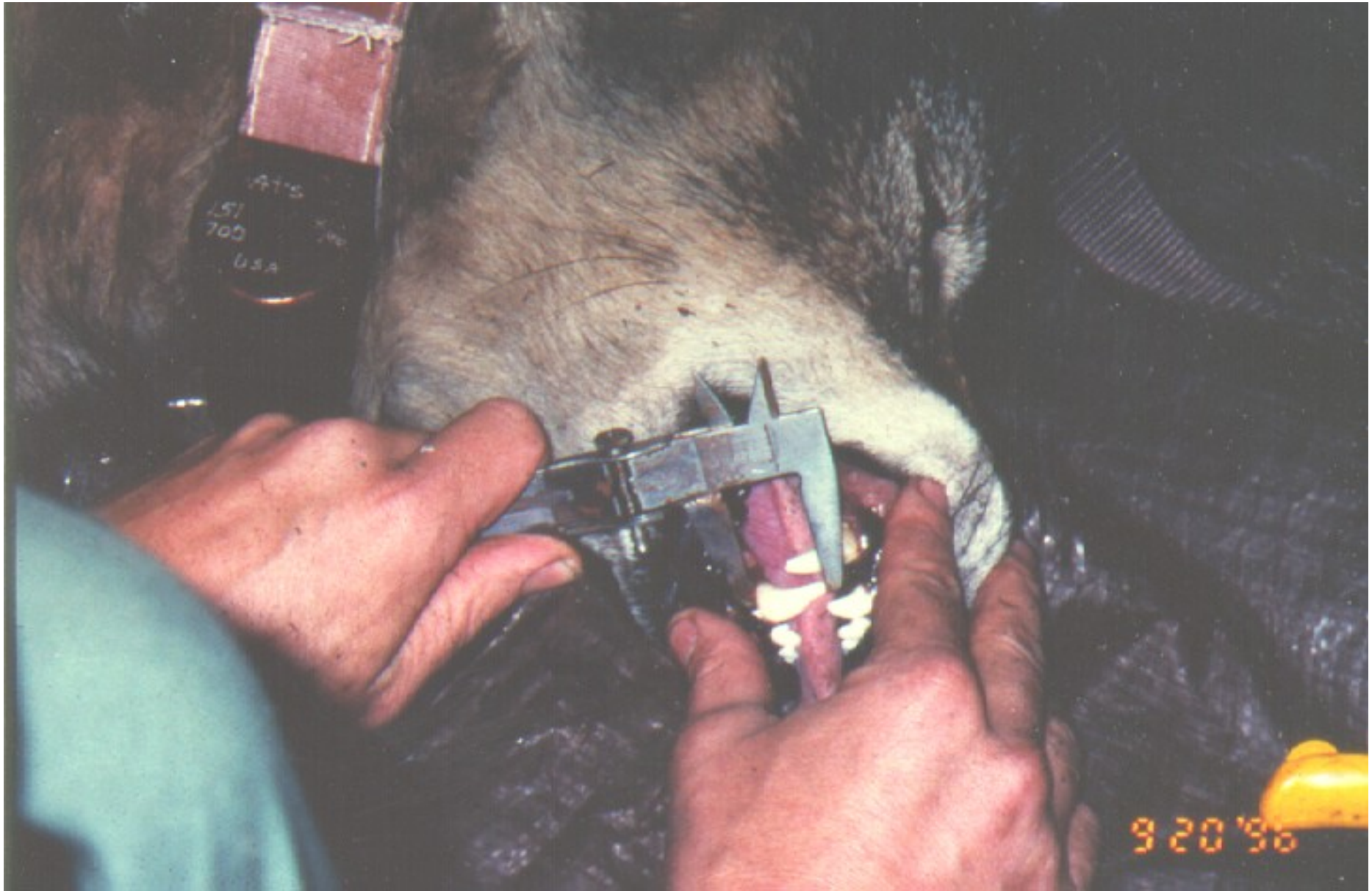
Bill Brown
Natural / Cultural Resource Specialist
Bill.Brown@mn.ngb.army.mil

Craig Erickson
GIS Manager
Craig.Erickson@mn.ngb.army.mil

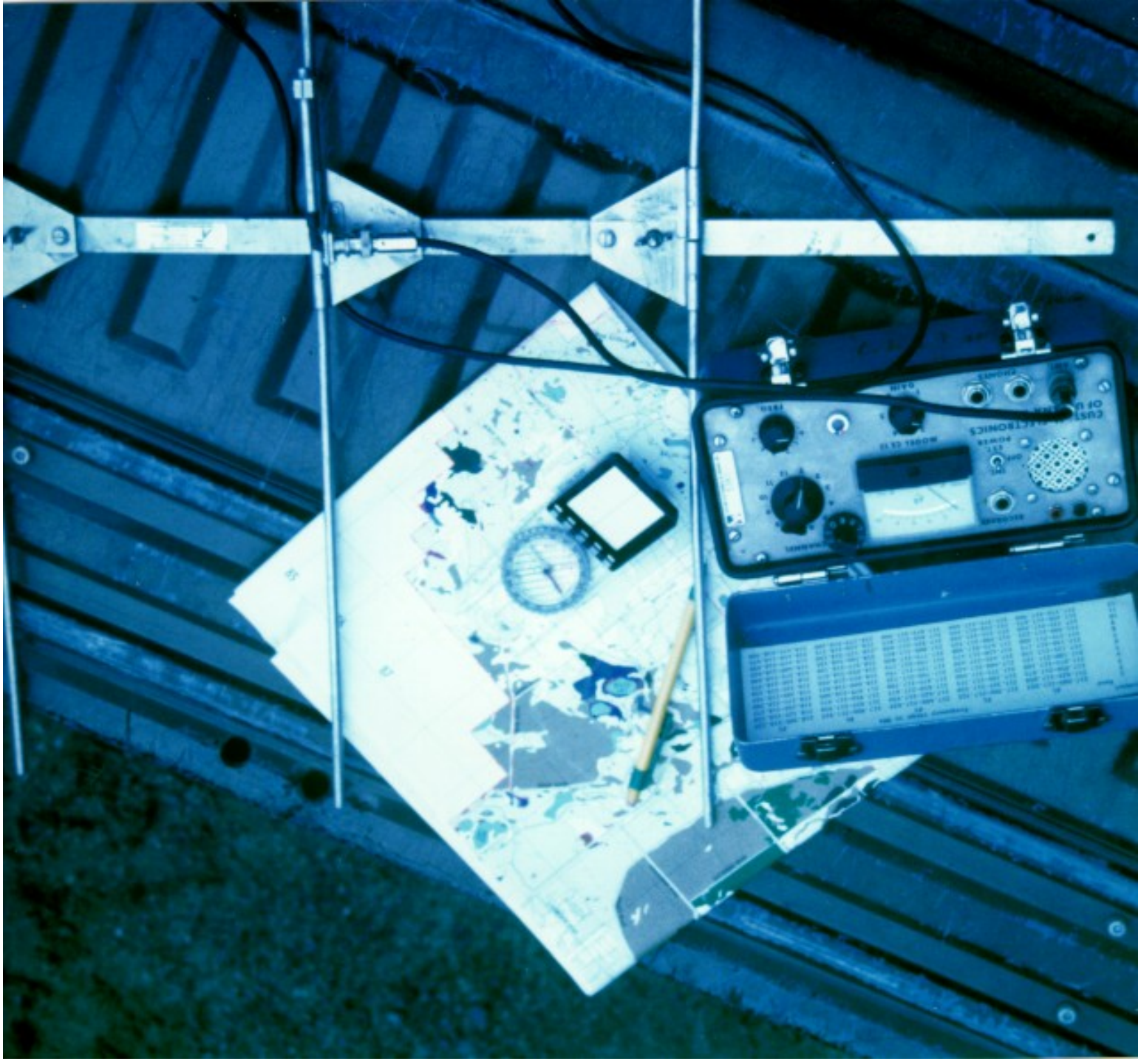

1988-1989
23,165 SQUARE MILES


1988-1989
23,165 SQUARE MILES
1997-1998
33,971 SQUARE MILES

9 20 '96


9 20 '96

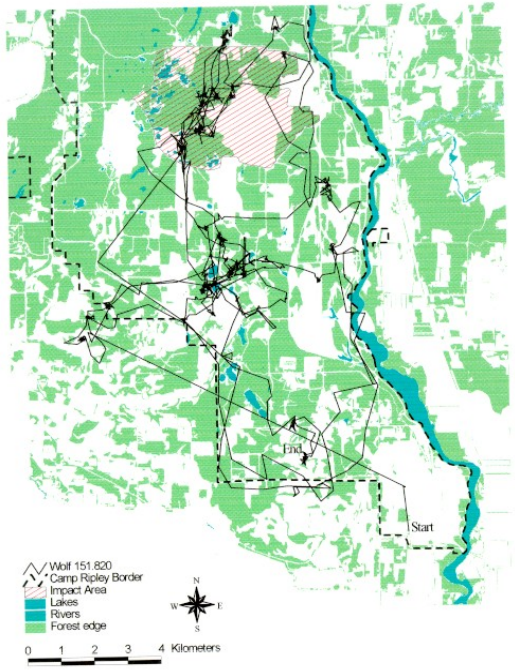
9 20



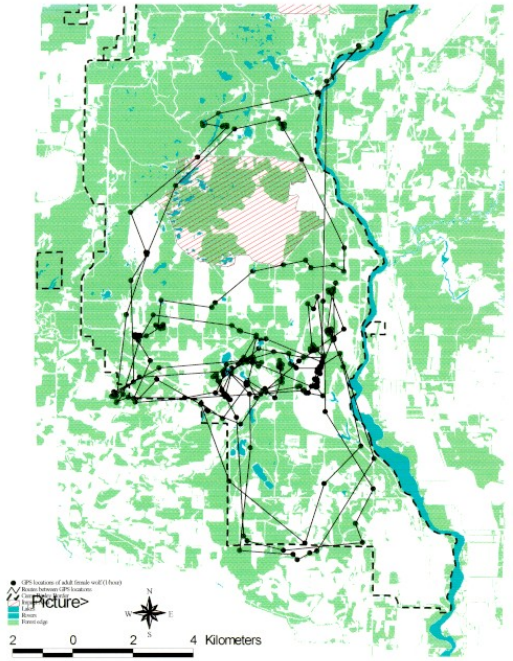
UNIVERSITY
OF
MINNESOTA

N280SP

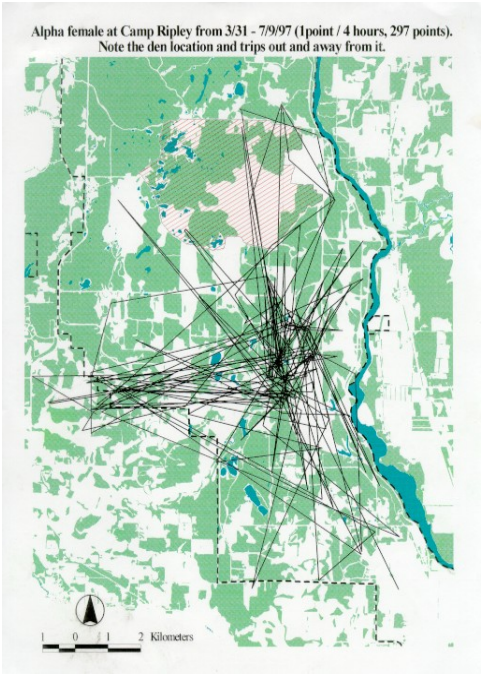
Wolf 151.820 (uncorrected), at 1/15 min from 2/20-3/13/97,
at Camp Ripley (Little Falls, MN).

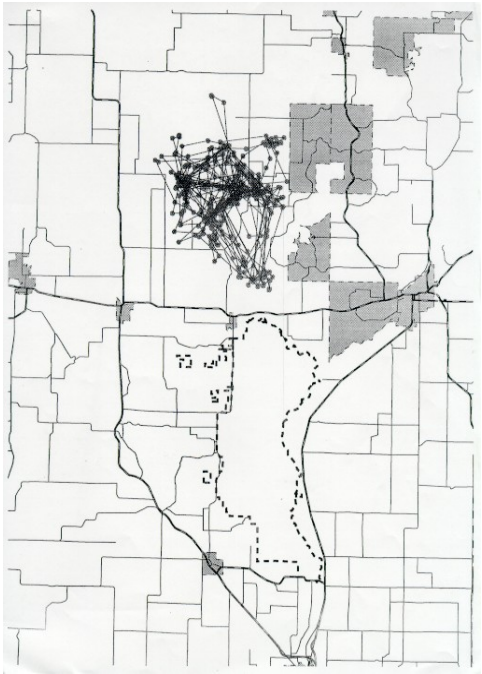


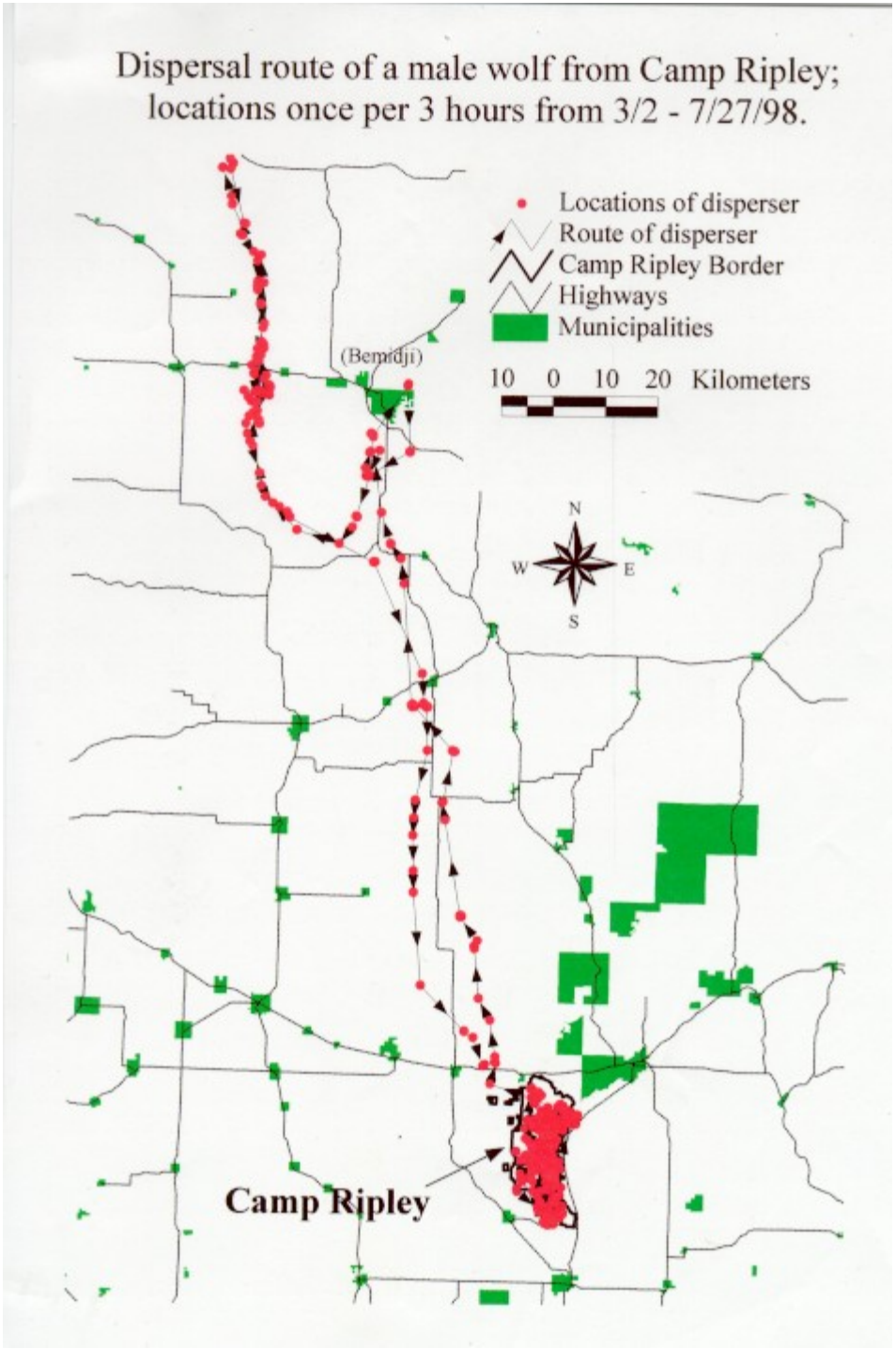
GPS data of alpha female wolf, at 1x/60 min from 2/22 to 3/8 1997
at Camp Ripley National Guard Training Site, Little Falls, MN.



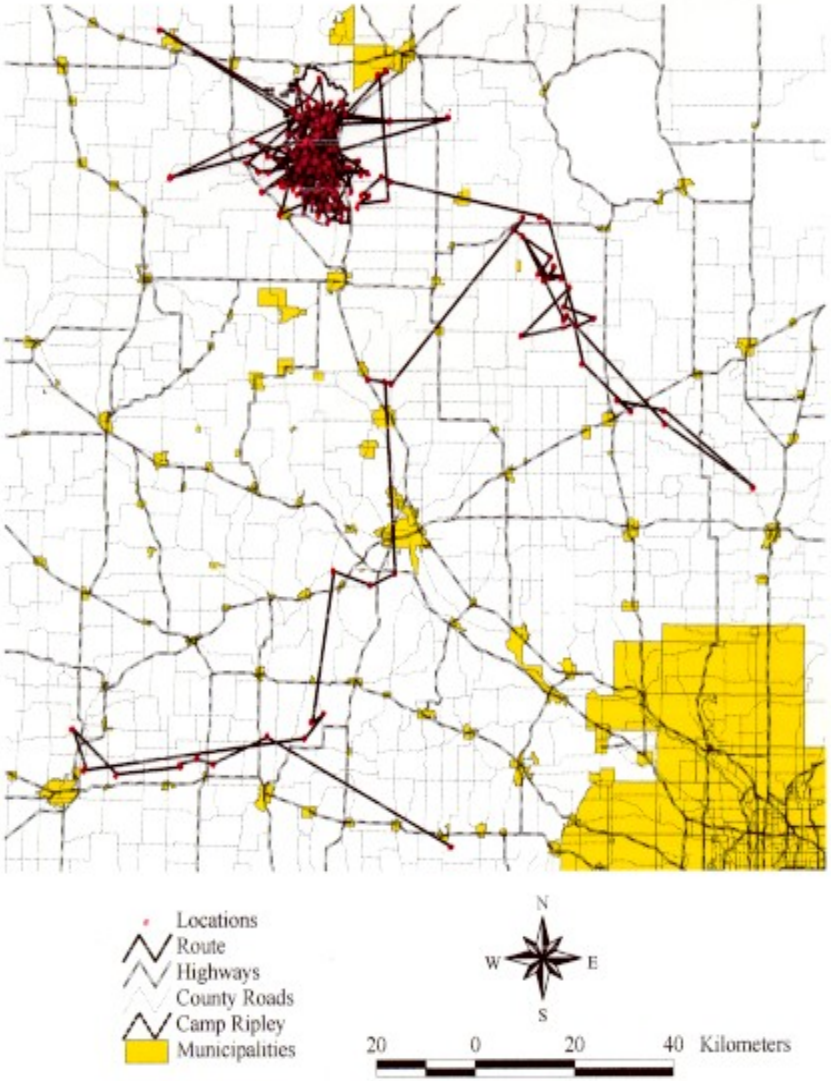
Alpha female at Camp Ripley from 3/31 - 7/9/97 (1point / 4 hours, 297 points).
Note the den location and trips out and away from it.

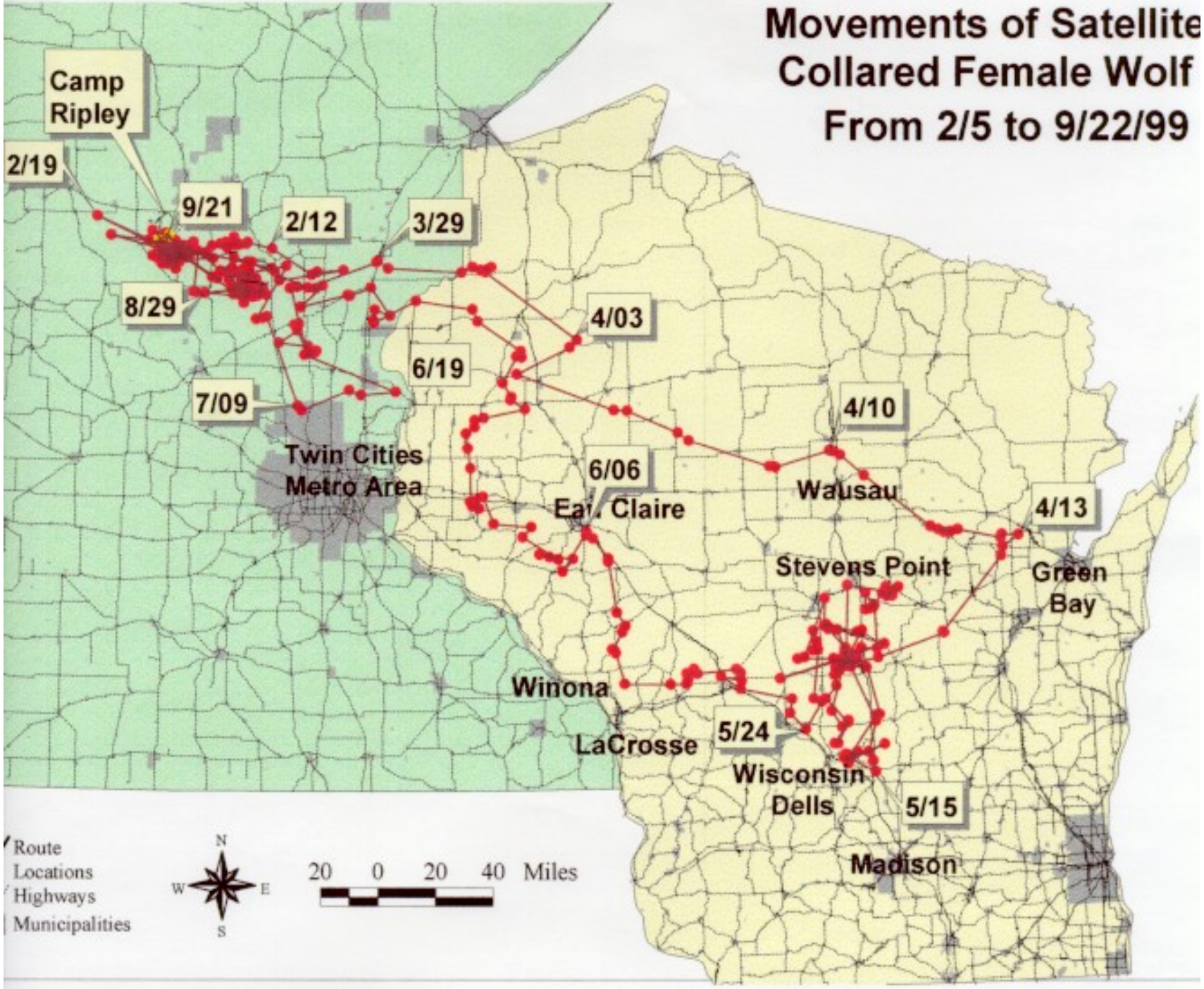





Dispersal route of a male wolf from Camp Ripley;
locations once per 3 hours from 3/2 - 7/27/98.
Locations of disperser
Route of disperser
Camp Ripley Border
Highways
Municipalities
10 0 10 20 Kilometers
N
W
E
S
(Bemidji)
Camp Ripley

Locations and route of a 2-year old male wolf dispersing from Camp Ripley, from 2/1 - 11/14/98; locations determined with a satellite collar, roughly once per 2 days.




Movements of Satellite
Collared Female Wolf
From 2/5 to 9/22/99
Camp
Ripley
2/19
9/21
2/12
3/29
8/29
4/03
6/19
7/09
4/10
Twin Cities
Metro Area
6/06
Eau Claire
Wausau
4/13
Stevens Point
Green
Bay
Winona
5/24
LaCrosse
Wisconsin
Dells
5/15
Madison
Route
Locations
Highways
Municipalities
N
W
E
S
20 0 20 40 Miles

Effect of Military Training on Wolf Movements

- GPS Data - Location, Distance, Direction, Time
- RFMSS Data - Location, Time, Type of Training Activity
- Analysis Tool - Compare, Sort, and Evaluate Records
- Statistical Analysis - Draw conclusions

GPS Data

FIELD NAME	DESCRIPTION
N1	Month GPS location was recorded
N2	Day GPS location was recorded
N3	Hour GPS location was recorded
N4	Minute GPS location was recorded
N5	Easting (X) coordinate of GPS location
N6	Northing (Y) coordinate of GPS location
Year	Year GPS location was recorded
Zval	Elevation of GPS locations (meters)

RFMSS Data

FIELD NAME	DESCRIPTION
Training	Training activity
Openday	Start year, month, and day of training activity
Closeday	End year, month, and day of training activity
FireX	Easting (X) coordinate of firing point
Actopen	Start time of training activity
FireY	Northing (Y) coordinate of firing point
Actclose	End time of training activity
FireZ (meters)	Elevation firing point locations

Analysis Tool

- Prepare GPS Table
  - Add TIME field to GPS table (yyyyMMddhhmm)
  - Add DISTANCE TO NEXT POINT field to GPS table
- Prepare RFMSS Table
  - Add STARTTIME field to RFMSS table (yyyyMMddh
  - Add ENDTIME field to RFMSS table (yyyyMMddhhm

- GPS Extract
  - Temporal comparison of GPS and RFMSS records
  - Extract pertinent GPS records
  - Calculate Additional Information

Analysis Tool

Identifies required fields in both the GPS and RFMSS tables

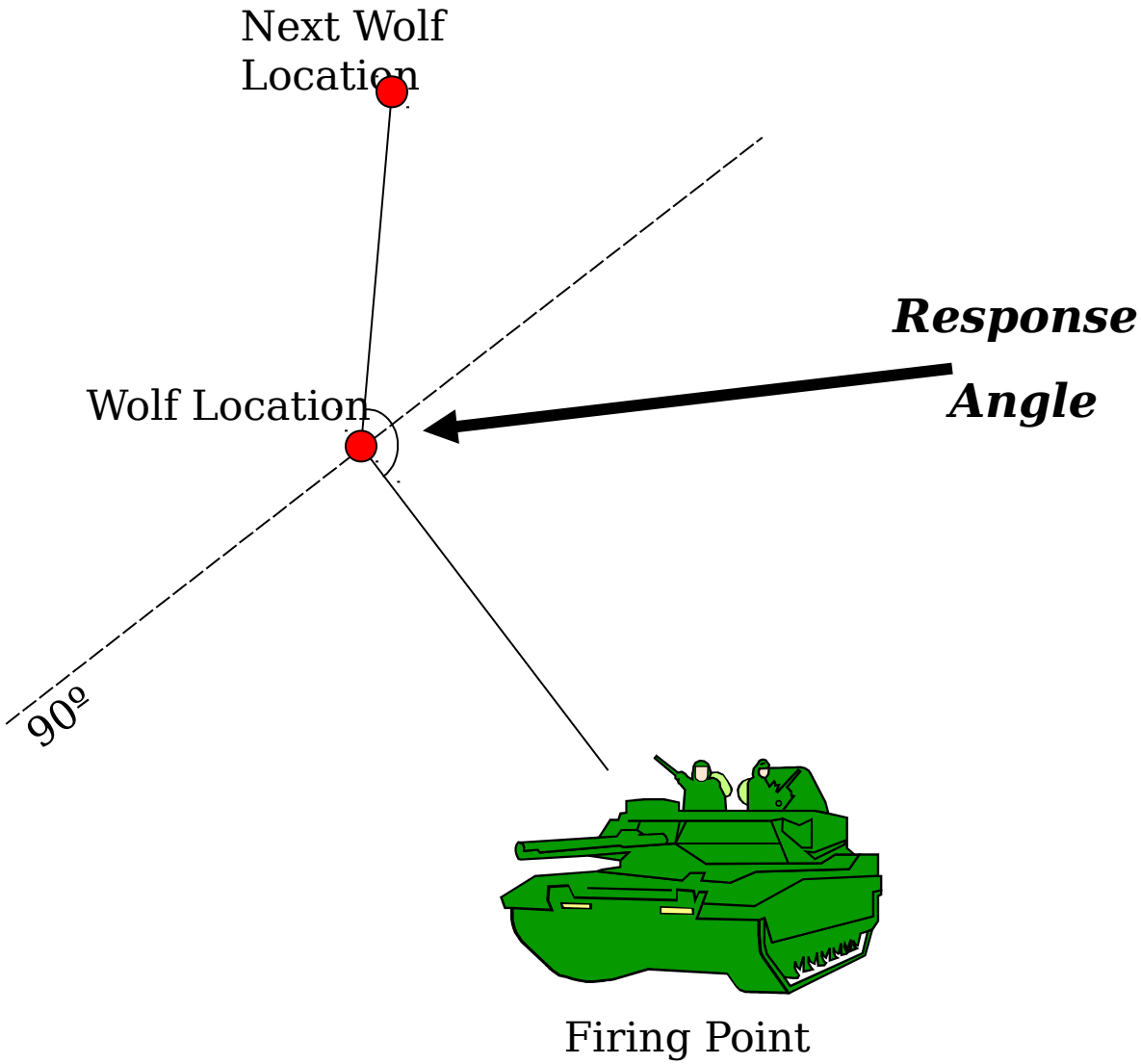
Displays a message box to select weapon type

Identifies GPS points that occurred immediately before, during, and immediately after each record of the selected weapon type

Creates a new table and populates it with the identified GPS points
(only on first record)

Adds and calculates the RESPONSE ANGLE field to the table of extracted GPS points

Response Angle



Analysis Tool

- Began with 2200 GPS points
- Ended with 186 GPS points remaining

Statistical Analysis

Variable	<90º (Toward)		>90º (Away)		z-score	p-value
	no.	%	no.	%		
All pairs of wolf locations	**111**	60	75	40	2.64	0.008**
<5 km	**49**	68	23	32	3.06	0.002**
155 mm howitzers	**3**	60	2	40	0.45	0.653
.50 caliber machine guns	**8**	80	2	20	1.9	0.064
.40 caliber machine guns	**27**	61	17	39	1.51	0.121
M-203 machine guns	1	50	1	50	0	0.96
M-60 machine guns	**3**	60	2	40	0.45	0.653
M-16 machine guns	**34**	63	20	37	1.91	0.051
7.62 mm mortars	10	50	10	50	0	0.96
5.56 mm mortars	**17**	68	8	32	1.8	0.064
4.2 mm mortars	**2**	100	0	0	1.41	0.147
Hand grenades	1	25	**3**	75	1	0.294
.22 caliber pistols	5	33	**10**	67	1.29	0.177

Statistical Analysis

Variable	<90º (Toward)		>90º (Away)		z-score	p-value
	no.	%	no.	%		
All pairs of wolf locations	**111**	60	75	40	2.64	0.008**
< 5 km	**49**	68	23	32	3.06	0.002**
155 mm howitzers	**3**	60	2	40	0.45	0.653
.50 caliber machine guns	**8**	80	2	20	1.9	0.064
.40 caliber machine guns	**27**	61	17	39	1.51	0.121
M-203 machine guns	1	50	1	50	0	0.96
M-60 machine guns	**3**	60	2	40	0.45	0.653
M-16 machine guns	**34**	63	20	37	1.91	0.051
7.62 mm mortars	10	50	10	50	0	0.96
5.56 mm mortars	**17**	68	8	32	1.8	0.064
4.2 mm mortars	**2**	100	0	0	1.41	0.147
Hand grenades	1	25	**3**	75	1	0.294
.22 caliber pistols	5	33	**10**	67	1.29	0.177

Statistical Analysis

COMBINED DATA SETS

Wolves were attracted to:

- Pooled weapon types (0.008)
- Pooled weapon types within 5 km (0.002)
- .50 Caliber Machine Guns (0.064)
- M-16 Machine Guns (0.051)
- 5.56 mm Mortars (0.064)

Statistical Analysis

YEARLING FEMALE

Wolf was repelled from:

- .22 Caliber Pistols (0.008)

Statistical Analysis

YEARLING MALE

Wolf was attracted to:

- Pooled weapon types (0.051)
- Pooled weapon types within 5 km (0.099)
- .50 Caliber Machine Guns (0.080)

Statistical Analysis

ALPHA MALE

Wolves were attracted to:

- Pooled weapon types (0.024)
- Pooled weapon types within 5 km (0.014)
- 5.56 mm Mortars (0.099)

Publications

Merrill, S. B. 2000. Road densities and Gray Wolf, Canis lupus, habitat suitability: an exception. Canadian Field-Naturalist 114: 312 - 313.

Merrill, S. B., and L. D. Mech. 2000. Details of extensive movements by Minnesota wolves (Canis lupus). American Midland Naturalist 144:428 - 433.

Merrill, S. B., L. G. Adams, M. E. Nelson, and L. D. Mech. 1998. Testing releasable GPS radiocollars on wolves and white-tailed deer. Wildlife Society Bulletin 26:830 - 835.

Thiel, R., S. B. Merrill, and L. D. Mech. 1998. Tolerance by denning wolves, Canis lupus, to human disturbance. American Midland Naturalist 112:340 - 342.

Merrill, S. B., and L. D. Mech. In prep. Analysis of wolf activity patterns using GPS telemetry.

Merrill, S. B., C. E. Erickson, and L. D. Mech. In prep. Wolf movements and military activities.

Merrill, S. B., and L. D. Mech. In prep. Effects of habitat bias on home range estimates in a GPS telemetry data set.

Merrill, S. B. 2000. A comparison of VHF, GPS, and satellite telemetry for studies in wolf biology. Wolf Print Magazine 6:14 - 17.

Merrill, S. B. 1999. GPS collars: The next wave in wolf tracking. International Wolf 9:3 - 5.

Merrill, S. B. 1996. The wolves of Camp Ripley. International Wolf 6: 7 - 9.